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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/668,199	09/22/2000	NAOFAL AL-DHAHIR	AL-DHAHIR 2	9867

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EXAMINER

WARE, CICELY Q

ART UNIT PAPER NUMBER

2634

DATE MAILED: 01/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/668,199

Applicant(s)

AL-DHAHIR, NAOFAL

Examiner

Cicely Ware

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 11 is/are rejected.
- 7) ☒ Claim(s) 2-4,6 and 12-18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Pg. 7, filed September 22, 2004 with respect to the rejection(s) of claim(s) 1-18 under 35 USC 112 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Calderbank et al. (US Patent 6,127,971) and Weinstein et al. (US Patent 5,539,832).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being obvious over Calderbank et al. (US Patent 6,127,971) in view of Weinstein et al. (US Patent 5,539,832)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an

invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

(1) With regard to claim 1, Calderbank et al. discloses in (Fig. 1) a receiver operating in an environment where a transmission channel (110-130), H , between a transmitter of information and said receiver (210-230) has a memory corresponding to n transmitted symbols, said receiver being responsive to an n_o plurality of receiving antennas (abstract, col. 1, lines 37-39, col. 2, lines 9-34, 39-57, col. 3, lines 22-27, 42-45, col. 6, lines 19-24).

However Calderbank et al. does not disclose a pre-filter having an $n_o \times n_i$ plurality of FIR filters, $F(j,k)$, where n_i is a number of transmitting antennas whose signals a said receiver is processing j is an index running from 1 to n_o and k is an index running from 1 to n_i , each filter being responsive to a signal that is derived from receiving antenna j ,

and applying its output signal to a pre-filter output point k and decision logic responsive to said pre-filter output points.

However Weinstein et al. discloses in (Figs. 1, 2, 3 and 4) a pre-filter (Fig. 1 (12)) having an $n_o \times n_i$ plurality of FIR filters, $F(j,k)$, where n_i is a number of transmitting antennas whose signals said receiver is processing j is an index running from 1 to n_o and k is an index running from 1 to n_i , each filter being responsive to a signal that is derived from receiving antenna j , and applying its output signal to a pre-filter output point k and decision logic (Fig. 7b (122)) responsive to said pre-filter output points (abstract, col. 1, lines 7-25, col. 2, lines 13-22, 35-40, 48-52, col. 3, lines 4-5, col. 4, lines 41-43, col. 5, lines 39-45, col. 8, lines 26-46, col. 9, lines 42-64, col. 10, lines 32-39).

Therefore it would have been obvious to one of ordinary skill in the art to modify Calderbank et al. in view of Weinstein et al. to incorporate a pre-filter having an $n_o \times n_i$ plurality of FIR filters, $F(j,k)$, where n_i is a number of transmitting antennas whose signals a said receiver is processing j is an index running from 1 to n_o and k is an index running from 1 to n_i , each filter being responsive to a signal that is derived from receiving antenna j , and applying its output signal to a pre-filter output point k and decision logic responsive to said pre-filter output points in order to estimate a plurality of input source signals, correct signal separation from their coupled observations and to estimate the desired signal to cancel the interfering signal or to estimate both source signals (Weinstein et al., col. 4, lines 30-36).

(2) With regard to claim 11, claim 11 inherits all the limitations of claim 1.

Calderbank et al. further discloses wherein said decision logic is adapted to receive from said transmitting antennas transmitted signals that were encoded in a space-time encoding schema in order to achieves high data rates and operates close to the limits given by outage capacity (abstract, Fig. 1, col. 1, lines 37-39, col. 6, lines 41-50).

Allowable Subject Matter

4. Claims 2-4, 6, 12-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a receiver operating in an environment a receiver operating in an environment where a transmission channel between a transmitter of information and a receiver has a memory corresponding to n transmitted symbols, the receiver being responsive to a plurality of receiving antennas. Prior art references show similar methods but fail to teach: **“a sampling circuit interposed between the plurality of antennas and the pre-filer that samples received signal at rate $T_s = T/l$, where l is an integer that is greater than 1, and T is symbol rate of a transmitter whose signals the receiver receives”,** as in claim 2; **“a preprocessor for computing coefficients of said FIR filters that result in an effective transmission channel memory between said transmitter and output of said pre-filter of transmitted symbols that is less than n ”,** as in claim 3; **“a preprocessor for computing coefficients of said FIR filters in response to a**

block of symbols that is received by the receiver, and installing the computed coefficients in said FIR filters”, as in claim 4; “coefficients of said FIR filters are computed and installed every time said transmission channel exhibits a significant change”, as in claim 6; “plurality of FIR filters is expressed by matrix W ”, as in claim 12; “plurality of FIR filters are subjected to designer constraints relative to any one or a number of members of the following set: transmission channel memory, size of said block, effective memory of the combination consisting of said transmission channel and said pre-filter; autocorrelation matrix R_{xx} , autocorrelation matrix R_{nn} , value of factor l in said sampling circuit, and decision delay”, as in claim 13; “matrix W ”, as in claim 14; “constraints restricts B ”, as in claim 15, 16, 17, and 18.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 703-305-8326. The examiner can normally be reached on Monday – Friday, 8-5.

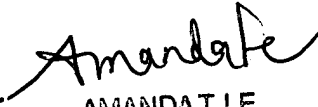
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Art Unit: 2634

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Cicely Ware

cqw
January 7, 2005


AMANDA T. LE
PRIMARY EXAMINER